

# New Records for Four Deep-Sea Shrimps from the Northeastern Pacific<sup>1</sup>

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IN 1961 the Department of Oceanography of Oregon State University began a long-term ecological study of the northeastern Pacific Ocean off Oregon extending to a distance of 833 km, generally between lat 43° and 46° N. Among the many deep-sea shrimps collected during the course of this study are four species which were taken in hauls made at positions well outside their previously recorded ranges. It is the purpose of this paper to discuss the distributions of these species as they are now known. All of the specimens have been deposited in the collections of the Department of Oceanography, Oregon State University. The collection of the specimens at sea by Department of Oceanography vessels was supported by U.S. Atomic Energy Commission contracts AT(45-1) 1726 and AT(45-1) 2227, Task Agreement no. 12, RLO-2227-T12-2.

ORDER DECAPODA  
SUBORDER NATANTIA  
SECTION PENAEIDEA  
FAMILY PENAEIDAE

## *Hemipenaeus spinidorsalis* Bate, 1881

*Hemipenaeus spinidorsalis* was originally described from specimens trawled by H.M.S. *Challenger* from near Tristan da Cunha in the South Atlantic and from near the Philippines in the Pacific (Bate, 1881, 1888). Faxon (1895) recorded the species in the eastern Pacific from off Central America and the Galápagos Islands. It has been taken at depths between 1,867 and 3,749 m (Ramadan, 1938). The two specimens recorded here were taken in a beam trawl to a depth of 3,687 m on 4 June 1970 between lat 44°40.7' N, long 133°28.1' W and lat 44°40.9' N, long 133°24.5'

W. The specimens are a male with a carapace length (postorbital) of 40 mm and a female with a carapace length of 53 mm.

*Hemipenaeus spinidorsalis* is closely related to *H. carpenteri* Wood-Mason. These species share a number of characters which, according to Ramadan (1938), may entitle them to sub-generic recognition: they possess a spine at the end of the carina of the third abdominal segment; the three anterior pereopods have a much longer carpus than the other species of the genus, and their meri are not flattened; they possess a podobranch on the 12th somite (third pereopod), an epipodite on the 13th somite (fourth pereopod), and exopods on all pereopods.

The two specimens possess characters as given by Faxon (1895) and Burkenroad (1936) which distinguish *H. spinidorsalis* from *H. carpenteri*: rostrum reaching beyond end of eyes and more than one-fifth the length of the carapace; antennular stylocerite reaching to the tip of externodistal tooth of proximal segment of antennular peduncle; and, in the male, having median blade of bipartite appendix masculina in the form of a long triangular tooth and shorter than the lateral blade, which is concave within and furnished with setae on its distal border (see Faxon, 1895, Plate L, Fig. 1<sup>e</sup> and 2).

## *Plesiopenaeus armatus* (Bate), 1881

*Plesiopenaeus armatus* was originally described from specimens trawled by H.M.S. *Challenger* from the South Atlantic, the Australian archipelago, the North Pacific (lat 34°37' N, long 140°32' E and lat 36°10' N, long 178°0' E), and from the South Pacific (Bate, 1881, 1888). Subsequently it has been recorded, under one name or another (Burkenroad, 1936, and Ramadan, 1938, discuss the synonymy of the genus and species), from the Indian Ocean (Alcock, 1901; Ramadan, 1938)

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and Atlantic Ocean (Smith, 1884; Faxon, 1896; Bouvier, 1905, 1908; Milne-Edwards and Bouvier, 1909; Sund, 1920; Roberts and Pequegnat, 1970). It has been taken at depths between 750 and 5,400 m.

The present specimen was taken in a beam trawl to a depth of 3,724 m on 3 June 1970 between lat 44°40.2' N, long 133°35.7' W and lat 44°39.5' N, long 133°38.3' W, and so is the first record of the species from the north-eastern Pacific. It is a female with a carapace length of 77 mm (combined rostrum and carapace length of 127 mm). The specimen agrees with descriptions of the species, possessing characters given by Burkenroad (1936) and Ramadan (1938) which distinguish it from other species in the genus: last four abdominal terga carinate dorsally, a mobile spine on merus of first and second pereopods, and a strong ischial tooth on first pereopods.

SECTION CARIDEA  
FAMILY OPLOPHORIDAE

*Acanthephyra micropthalma* Smith, 1885

*Acanthephyra micropthalma* was originally described from specimens trawled from the western Atlantic off the east coast of the United States (Smith, 1885, 1886). Elsewhere in the Atlantic it has been recorded from off Portugal by Coutière (1911) and from southwest of the Azores by Sivertsen and Holthuis (1956). Alcock (1901) recorded it from the Bay of Bengal. In the Pacific it has only been recorded from the Celebes Sea and the southern Pacific by Bate (1888) as *A. longidens* Bate. It has been taken at depths between 2,000 and 4,700 m (Sivertsen and Holthuis, 1956).

The present specimen was taken in a beam trawl to a depth of 3,655 m on 1 June 1970 between lat 44°27' N, long 132°14' W and lat 44°24.6' N, long 132°12.9' W, and so is the first record of the species from the north-eastern Pacific. The specimen, which is a female with a carapace length of 22 mm, agrees with the descriptions and figures of the species in the literature.

*Systellaspis cristata* (Faxon), 1893

*Systellaspis cristata* was originally described from specimens taken by the *Albatross* from

the Gulf of Panama (Faxon, 1893, 1895), and has subsequently been recorded from the Indian Ocean (Alcock and Anderson, 1896; Anderson, 1896; Alcock, 1899, 1901; Balss, 1925) and Atlantic Ocean (Balss, 1925; Holthuis, 1951; Springer and Bullis, 1956; Figueria, 1957; Fisher and Goldie, 1961; Crosnier and Forest, 1968; Foxton, 1970). It has been recorded from hauls made to 3,200 m.

Although Forss (1966) figured and discussed a damaged specimen of *Systellaspis cristata* from off Oregon (taken at night from a depth range of 1,000–500 m, on 20 October 1964, between lat 44°28' N, long 125°20' W and lat 44°34.5' N, long 125°31.4' W), it is nevertheless satisfying to record the species from the area again. Two additional specimens have been identified from OSU oceanography collections. The first, a female with a carapace length of 11 mm, was taken in an Isaacs-Kidd midwater trawl towed at night through the depth range 200–0 m, on 20 July 1961, between lat 46°14.4' N, long 124°40.4' W and lat 46°14.4' N, long 124°33.6' W. A second female specimen (carapace length 11.5 mm), also from an Isaacs-Kidd midwater trawl, was taken during a daylight tow on 23 September 1969, at a station located 65 miles off the central Oregon coast (lat 44°39.2' N, long 125°39.8' W), from a depth range of 500–0 m. Both specimens agree with the description of the species given by Holthuis (1951).

DISCUSSION

The actual depth of capture of specimens taken by open trawls and dredges is always in doubt since these may take specimens during descent and ascent, in addition to the normal samples taken on the bottom. Because of this, it is proper to ask whether the shrimps *Hemipenaeus spinidorsalis*, *Plesiopenaeus armatus*, and *Acanthephyra micropthalma*, which were collected only by bottom trawls, are benthic or pelagic.

Examination of foregut contents from the specimens of *Hemipenaeus spinidorsalis* and *Plesiopenaeus armatus* showed the following to be present: calcareous shell fragments; Radiolaria; Foraminifera; and unidentified crustacean remains. In addition, the foregut contents from

*Hemipenaeus spinidorsalis* included small sections of brown tube composed of cemented debris, whereas those from *Plesiopenaeus armatus* included fairly large pieces of skeletal plates and spines from ophiuroid arms, several segments of a hollow calcareous tube, and a large amount of what appeared to be sediment.

The evidence presented by the foregut contents from these specimens thus indicates that they had resorted to the bottom to feed. This conclusion, along with the fact that all the previous capture records for the two species are only from trawl or dredge samples, suggests a benthonic existence for both *Hemipenaeus spinidorsalis* and *Plesiopenaeus armatus*.

Although most adult Penaeidae, whether neritic or oceanic, are benthonic, a pelagic existence does occur sporadically throughout the family, and it is possible that behavior of both types is found together in certain abyssal species of the family (Burkenroad, 1936). Conceivably then, specimens of *Hemipenaeus spinidorsalis* and *Plesiopenaeus armatus* might swim up from the bottom at times, so that they might be taken by pelagic hauls. That these species do have a strong swimming capability is suggested by their long and well-developed pleopods.

Burkenroad (1937) pointed out, however, that "the term *benthonic* when applied to Decapoda Natantia, can refer at most to a vital dependence upon the bottom, rather than to an entirely substratal existence." If this is accepted, then the apparent obligatory resort to the bottom to feed by the specimens of *Hemipenaeus spinidorsalis* and *Plesiopenaeus armatus* would bring these species within the range of the term, even though at times they might conceivably be found in the water column.

The environmental characteristics of the sediments and bottom water at the station where *Hemipenaeus spinidorsalis* and *Plesiopenaeus armatus* were taken are as follows (A. G. Carey, personal communication): sediments (0.3 percent sand, 62.1 percent silt, and 37.7 percent clay); bottom water (1.55°C, 2.98 ml/liter O<sub>2</sub>, and 34.66 ‰ salinity).

The situation is somewhat different in the case of *Acanthephyra microphthalmia*. This species, together with *Systellaspis cristata*, belongs to a family (Oplophoridae) which appears to

be exclusively pelagic in habitat (Kemp, 1939). Examination of the published capture records for this species reveals, however, that all except one are from trawl or dredge samples. The exception is that reported by Coutière (1911) who recorded the species (as *Acanthephyra longidens* Bate) from a "Bourée net" towed at a high rate of speed. The samples collected with this net consisted entirely of shrimps considered to be pelagic, the vast majority belonging to the Oplophoridae. The foregut contents of the present specimen consist solely of unidentified crustacean remains, with a complete lack of any remains indicating bottom foraging, as was the case in the other two species. In addition, the pereopods do not appear to show any special adaptations for a benthic existence, but appear to be similar to those of other members of the genus.

Thus, it can be concluded that *A. microphthalmia* is a species which is probably not confined to the immediate neighborhood of the bottom, but which does show structural evidences of inhabiting very great depths (very poorly developed eyes and soft integument). The presence of this species in the sample thus would be due to its having been caught either as the trawl descended or ascended. If this is the case, the vertical distribution of the species is almost certainly below 1,000 m, inasmuch as it has never been taken in the many midwater trawls from 0–1,000 m which have been taken off Oregon.

#### LITERATURE CITED

- ALCOCK, A. 1899. A summary of the deep-sea zoological work of the Royal Indian Marine Survey Ship "Investigator" from 1884 to 1897. Sci. Mem. Med. Offrs. Army India 11:1–49.
- . 1901. A descriptive catalogue of the Indian deep-sea Crustacea Decapoda Macrura and Anomala in the Indian Museum. Indian Museum, Calcutta. 286 p.
- ALCOCK, A., and R. S. ANDERSON. 1896. Illustrations of the zoology of the Royal Indian Marine Surveying Steamer "Investigator," Crustacea, pt. 4, pl. 16–17.
- ANDERSON, R. S. 1896. An account of the

- deep sea Crustacea collected during the season 1894-95. Natural history notes from H.M. Royal Indian Marine Survey Ship "Investigator," Commander C. F. Oldham, R.N., commanding, ser. 2, no. 21. J. Asiat. Soc. Bengal 65 (2):88-106.
- BALSS, H. 1925. Macrura der deutschen Tiefsee-Expedition. 2. Natantia, Teil A. Wissenschaftliche Ergebnisse der deutschen Tiefsee Expedition auf dem Dampfer "Valdivia" 1898-1899, 20 (5):217-315.
- BATE, C. S. 1881. On the Penaeidea. Ann. Mag. Nat. Hist., ser. 5, 8 (45):169-196.
- . 1888. Crustacea Macrura. In Report on the scientific results of the voyage of H.M.S. Challenger during the years 1873-76. Vol. 24 (part LII):1-942. Her Majesty's Stationery Office, London.
- BOUVIER, E. L. 1905. Sur les Pénéides et les Sténopides recueillis par les expéditions françaises et monégasques dans l'Atlantique orientale. C. R. Acad. Sci., Paris 140:980-983.
- . 1908. Crustacés décapodés (Pénéidés) provenant des campagnes de l'*Hirondelle* et de la *Princesse-Alice* (1886-1907). Résult. Camp. Sci. Monaco 33:1-122.
- BURKENROAD, M. D. 1936. The Aristaeinae, Solenocerinae and pelagic Penaeinae of the Bingham Oceanographic Collection. Bull. Bingham Oceanogr. Coll. 5(2):1-151.
- . 1937. Some remarks on the structure, habits, and distribution of the benthonic sergestid *Sicyonelle* Borradaile (Crustacea, Decapoda). Ann. Mag. Nat. Hist., ser. 5, 19 (49):505-514.
- CROSNIER, A., and J. FOREST. 1968. Note préliminaire sur les Carides recueillis par l'"Ombango" au large du plateau continental du Gabon à l'Angola (Crustacea Decapoda Natantia). Bull. Mus. Hist. nat., Paris, ser. 2, 39 (6):1123-1147.
- COUTIÈRE, H. 1911. Sur les Crevettes Eucyphotes recueillies en 1910 au moyen du Filet Bourée, par la *Princesse-Alice*. C. R. Acad. Sci., Paris 152:156-158.
- FAXON, W. 1893. Reports on the dredging operations off the west coast of Central America to the Galapagos . . . VI. Preliminary descriptions of new species of Crustacea. Bull. Mus. Comp. Zool. Harv. 24 (7):149-220.
- . 1895. Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, etc. XV. The stalk-eyed Crustacea. Mem. Mus. Comp. Zool. Harv. 18:1-292.
- . 1896. Reports on the results of dredging . . . in the Gulf of Mexico and the Caribbean Sea, and on the east coast of the U.S., 1877 to 1880, by the U.S. Coast Survey Steamer "Blake." Bull. Mus. Comp. Zool. Harv. 30 (3):154-166.
- FIGUEIRA, A. J. G. 1957. Madeiran decapod crustaceans in the collection of the Museu Municipal do Funchal. I. On some interesting deep-sea prawns of the families Pasiphaeidae, Oplophoridae and Pandalidae. Bol. Mus. Funchal 10 (25):22-51.
- FISHER, L. R., and E. H. GOLDIE. 1961. New records for two deep-sea decapods. Crustaceana 2 (1):78-79.
- FORSS, C. A. 1966. The oplophorid and pasiphaeid shrimp from off the Oregon coast. Ph.D. thesis, Oregon State Univ. Corvallis.
- FOXTON, P. 1970. The vertical distribution of pelagic decapods (Crustacea: Natantia) collected on the SONDA cruise, 1965. I. The Caridea. J. Mar. Biol. Ass. U.K. 50 (4): 939-960.
- HOLTHUIS, L. B. 1951. The Caridean Crustacea of tropical west Africa. Atlantide Rep. 2:7-187.
- KEMP, S. W. 1939. On *Acanthephyra purpurea* and its allies (Crustacea Decapoda; Hoplophoridae). Ann. Mag. Nat. Hist., ser. 11, 24:568-579.
- MILNE-EDWARDS, A., and E. L. BOUVIER. 1909. Reports on the results of dredging in the Gulf of Mexico . . . by the U.S. Coast Survey Steamer "Blake." XLIV. Les Pénéides et Sténopides. Mem. Mus. Comp. Zool. Harv. 28 (3):181-274.
- RAMADAN, M. M. 1938. Crustacea: Penaeidae. Sci. Rep. Murray Exped. 5 (3):35-76.
- ROBERTS, T. W., and W. E. PEQUEGNAT. 1970. Deep-water decapod shrimps of the family Penaeidae, p. 21-57. In W. E. Pequegnat and F. A. Chace, Jr. [ed.] Contributions on the biology of the Gulf of Mexico. Gulf Publ. Co., Houston, Texas.
- SIVERTSEN, E., and L. B. HOLTHUIS. 1956.



- Crustacea Decapoda (the Penaeidae and Stenopodidae excepted). Rep. Sars N. Atl. Deep Sea Exped. 5 (12):1-54.
- SMITH, S. I. 1884. Report on the decapod Crustacea of the "Albatross" dredgings off the east coast of the United States in 1883. Rep. U.S. Comm. Fish. 10:345-426.
- . 1885. On some new or little known decapod Crustacea, from recent Fish Commission dredgings off the east coast of the United States. Proc. U.S. Nat. Mus. 7:493-511.
- . 1886. Report on the decapod Crustacea of the "Albatross" dredgings off the east coast of the United States during . . . 1884. Rep. U.S. Comm. Fish. 13:605-706.
- SPRINGER, S., and H. R. BULLIS, JR. 1956. Collections by the "Oregon" in the Gulf of Mexico. Spec. Sci. Rep. U.S. Fish Wildl. Serv. 196:1-134.
- SUND, O. 1920. Peneides and stenopides from the "Michael Sars" North Atlantic Deep-Sea Expedition 1910. Rep. Sars N. Atl. Deep Sea Exped. 3 (part 2, no. 7):1-36.